

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the reasons that follow.

No claims are currently being amended. Claims 1-12 remain pending in this application.

Rejection under 35 U.S.C. § 102

Claims 1-12 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,546,179 to Cheng (hereafter “Cheng”). Applicant respectfully traverses this rejection for at least the following reasons.

Independent claims 1, 5, 11 and 12 all recite that the focal position of exposure light is controlled on the basis of the height of the edge detected by the sensor, a feature not disclosed or suggested by Cheng. Cheng discloses that for his apparatus adjustment of the focal position is completed before the sensor is moved to the edge portion of the wafer. As shown in Figure 3, in the Cheng procedure, the focal position adjustment is performed first (see step 80), and then the optical sensor is moved toward the wafer edge only after the focal adjustment (see step 82). Thus, Cheng fails to suggest that the focal position of exposure light is controlled on the basis of the height of the edge detected by the sensor, and claims 1, 5, 11 and 12 are all patentable over Cheng for at least this reason.

In fact, Cheng specifically teaches away from controlling the focal position on the basis of detecting the height of the edge of the wafer. Cheng discloses with respect to step 78 where the sensor device is moved: “The actual point on wafer 22 over which sensor device 24 is positioned is not critical as long as the point is on the wafer 22 at least a small distance (e.g., more than about 2mm) away from the edge of the wafer.” (col. 8, lines 16-20, emphasis added). Only after the sensor device 24 is positioned in step 78, is the emitter 40 and detector 42 used to focus the sensor device (see col. 9, lines 38-59). Thus, at best Cheng detects the height of a point on the wafer away from the edge using the emitter 40 and detector 42.

The Office Action on page 5 argues that Chen shows in Figure 4 and col. 9, lines 38-58 that the focal position is based on the height of the edge of the wafer. As applicants discuss above, however, the cited section of Cheng only discloses that Cheng detects the height of a point on the wafer away from the edge. Thus, Cheng fails to disclose or suggest that the focal position of exposure light is controlled on the basis of the height of the edge detected by the sensor, as recited in claims 1, 5, 11 and 12.

Independent claim 1 recites “an optical section for radiating exposure light toward the edge of the semiconductor wafer, the semiconductor wafer having a resist thereon.” Cheng neither disclose this feature, nor its attendant advantages.

While Cheng discloses measuring the intensity of electromagnetic radiation reflected from a wafer, and moving a sensor to a focal distance, Cheng does not disclose or suggest an optical section for irradiating exposure light toward the edge of the semiconductor wafer, the semiconductor wafer having a resist thereon. The electromagnetic energy from the emitter 40 of Cheng is for the purpose of providing radiation to be reflected from a wafer so that the intensity of the reflected radiation can be determined. The emitter 40 of Cheng does not disclose irradiating exposure light as recited in claim 1, toward an edge of a wafer having resist thereon. Nowhere does Cheng disclose that the structure of the emitter 40 is such so as to provide electromagnetic energy sufficient to expose resist. The electromagnetic energy from the emitter 40 is not for the purpose of exposing resist, i.e., it is not exposure light. Instead, Cheng is directed to an apparatus for mapping the surface of a wafer. Thus, Cheng fails to disclose the structure of claim 1 of the optical section for radiating exposure light as recited in claim 1.

The Office Action cites to Cheng at col. 7, lines 22-39 as disclosing a semiconductor wafer having a resist thereon. This cited section of Cheng, however, does not disclose any resist on the wafer 22.

Further, Cheng does not suggest the advantages of the invention of claim 1, where the apparatus may solve problems associated with exposing the edge of resist films on a

substrate, for example when the substrate has layers formed thereon. As discussed above Cheng is not concerned with directing exposure light to a wafer so that resist may be exposed.

Independent claim 5 is directed to a wafer edge exposure method including detecting the height of an edge of a semiconductor wafer, the semiconductor wafer having a resist thereon, and controlling the focusing position of exposure light radiated toward the edge, on the basis of the height of the edge. Thus, for at least the same reasons as claim 1, claim 5 is also patentable over Cheng.

The dependent claims ultimately depend from either independent claim 1 or claim 5, and are patentable for at least the same reasons, as well as for further patentable features recited therein. For example, claims 9 and 10, respectively recite “radiating exposure light irradiates only an annular portion of the edge” and “wherein only an annular portion of the edge is irradiated in the exposure step.” These features are not suggested in Cheng.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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